Remarks

Claims 1-7, 10-13, 16, 19 and 23-28 are presented for the Examiner's review and consideration. Claims 1-7, 10-11, 13, 16, 19-20, 23, 25, and 28 have been amended, and claim 29 have been cancelled. Applicants believe the claim amendments and remarks herein serve to clarify the present invention and are independent of patentability. No new matter has been added. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks is respectfully requested.

35 U.S.C. §101 Rejections

Claims 1-7, 10-13, 16, 19, and 23-29 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter.

Specifically, the rejection stated that the claims are drawn to "a method for computing a point in a phase space" and "a method for computing a curve in a phase space," and as such the claimed invention does not fall within at least one of the four categories of patent eligible subject matter recited in 35 U.S.C. 101. The Examiner further stated that the claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea, natural phenomenon, or law of nature) and is not directed to a practical application of such judicial exception because the claims do not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result.

Applicants have amended the claims to more particularly specify "A computer implemented method for displaying…", which clearly shows that the presently claimed invention produces a tangible result.

With respect to the Examiner's statement that "[t]he steps of the claims are not sufficiently precise enough to guarantee that the same result will be produced for the same sets of inputs", Applicants respectfully disagree. If the same input is placed into the equations of the presently claimed invention, the same results are obtained each and every time. These results are displayed in the same way as well. Therefore, the presently claimed invention produces a useful tangible result.

In light of the foregoing, the claims are directed to non-abstract ideas and include a tangible result. Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §101 rejections.

35 U.S.C. §112 Rejections

Claims 23-25 were rejected under 35 U.S.C. §112, second paragraph, for lack of antecedent basis with respect to "the first sequence". Applicants have amended claims 23 and 25 to more clearly recite "the sequence".

In light of the foregoing, Applicants respectfully submit that the rejection under 35 U.S.C. §112 has been overcome and should be withdrawn.

35 U.S.C. §103 Rejections

Claims 1-7, 10-13, 16, 19, and 21-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Stewart (US Patent 6,195,103 B1) ("Stewart"), in view of Caccavale (US Patent 5,664,106) ("Caccavale"). In response, Applicants respectfully submit that this rejection should be withdrawn.

Applicants would like to respectfully point out that although the Examiner rejected the above claims under Stewart in view of Caccavale, the Examiner did not point out how Caccavale teaches or suggests the presently claimed invention. Applicants respectfully request clarification of "how" Caccavale is being used as the basis of the Examiner' rejection.

The following is a brief overview of the presently claimed invention that was originally given in the previous Response With Amendment. The presently claimed invention relates to a method and computer system for computing and displaying a phase space, and more particularly, a method and computer system for the analysis and visualization of data, in particular with respect to financial data, such as stock market data. (Abstract).

The presently claimed invention can be applied for the analysis and visualization of data samples from the fields of sociology, such as data from opinion polls, or even for comparison of the relative performance of football-teams. (¶[0051]). Furthermore, the invention is not restricted

to data samples covering a specific period of time. Especially for data samples obtained from the fields of physical experiments and technology, the series of the data samples can also span other dimensions like length, energy or speed. (¶[0052]).

The presently claimed invention is advantageous in that it enables valuation of the volatility versus the development of the observed variable over a specific period. (¶[0007]). In the case of financial data this enables relating the return to the volatility, such as for the comparison of the characteristics and performance of financial and stock market values. (Id). According to a preferred embodiment the relation of the return and the volatility is displayed in a phase space. (¶[0008]).

Further the presently claimed invention enables computation of a curve in the phase space. The points of the curve are calculated based on consecutive sub-sequences of the sequence of data samples. In the case of stock market data, a logarithmic grid is preferably used for determining the sub-sequences. (¶[0010]). This is of particular advantage for stock market data. For many stock values the volatility scales as the square root of time. (¶[0011]). This is compensated for by the logarithmic grid. (Id.)

FIG. 3 of the presently claimed invention shows an example of a display of the phase space with a corresponding sub-space. The phase space is defined by a coordinate system. The x-axis of the coordinate system is the scaled volatility and the y-axis is the return R. (¶[0073]). This way the relative performance and the differences in the quality of the stocks being considered become apparent. (¶[0075]).

An additional curve 3a delimits a further sub-space corresponding to a choice of a probability threshold... (¶[0078]). In essence the display shown in accordance with FIG. 3 enables intuitively comparing the relative performances and quality of a portfolio of stocks over an arbitrarily chosen time frame. (¶[0082]).

Thus the presently claimed invention enables an intuitive comparison of both volatility and return, for a variety of possible parameters, measured against a variety of possible dimensional values, where the result is adjusted so that the displaying is effective for different time periods. The calculations for volatility and return are different, and generate a more meaningful result

14

than the prior art, especially Stewart. Further, the form of display intuitively conveys more information than in the prior art.

With respect to claim 1 (and similarly claims 23 and 25), the Examiner states on page 8 of the present Office Action that the "formula disclosed by Stewart (See Stewart Column 6, lines 54-65) is the same as the one stated by the applicant". The approximation of the logarithmic returns is the last part of the Applicant's equation." However, Stewart merely teaches that the program computes the relative changes or standardized returns from the time series data $X(t_i)$: $x(t_i)=[\ X(t_i)- X(t_{i-1})]/ X(t_{i-1})$. (Col. 6, lns. 56-58), where $x(t_i)$ is referred to as the fluctuations. (Id). Nowhere is a logarithmic operation performed by Stewart's $X(t_i)$: $x(t_i)=[\ X(t_i)- X(t_{i-1})]/ X(t_{i-1})$. On the other hand, independent claim 1 (and independent claims 23, 25, and 28) has been amended to more clearly state:

calculating and storing with an electronic processor a single volatility of the sequence, *wherein the volatility is calculated in accordance to:*

$$\overline{\sigma_{t_0,t_1}(p)} = \frac{1}{\sqrt{t_1 - t_0} - 1} \sqrt{\sum_{t=t_0}^{t_1-1} (\overline{R_{t_0,t_1}(p)} - R_{t,t+1}(p))^2} \longrightarrow$$

wherein $\ \overline{R_{t,t+1}(p)} = \ln(p_{t+1}) - \ln(p_t) \approx \dfrac{p_{t+1} - p_t}{p_t}$, and

wherein $\ \overline{R_{t_0,t_1}(p)} = \dfrac{1}{t_1 - t_0} \sum_{t=t_0}^{t_1-1} \ln(p_{t+1}) - \ln(p_t)$.

Nowhere does Stewart teach this. This new language is similar to the language of canceled claim 29, which the Examiner merely states is "either disclosed by Stewart or are old and well known". If this is true, then the Examiner should be able to particularly point out in Stewart where this element of claim 1 and the other independent claims is taught. Furthermore, Applicants respectfully request that the Examiner identify any patents and/or publications to substantiate the Examiner's statement of "are old and well known". Accordingly, because Stewart does not teach or suggest at least this claim element, the presently claimed invention distinguishes over Stewart.

The Examiner correctly states on page 6 of the present Office Action that "Stewart does not explicitly teach the steps of determining and storing with the electronic processor a first and a

second coordinate value of a point in phase space based on the volatility and the net change; and providing as an output of the electronic processor a display of the point in phase space. However, the Examiner takes Official notice that these steps are old and well known in the financial art. The Examiner states "For instance computing the expected return and variance of a security and plotting in the mean-variance space has been in vogue at least for the last three decades. This plot helps in the selection of securities according one's risk-return preferences. It would have been obvious to one of ordinary skill in the art at the time of invention to modify Stewart to include this feature. The combination suggests that users would have benefited from selecting a security according to their risk-return preferences." Applicants respectfully request that if Examiner's statements are based on facts within the personal knowledge of the Examiner, Applicants respectfully request that the Examiner support these facts by filing an affidavit as is allowed under MPEP §707 citing 37 CFR 1.104(d)(2).

With respect to claim 28, the remarks and arguments made above with respect to claim 1 and the newly added language of <u>wherein the volatility is calculated in accordance to:</u>

$$\overline{\sigma_{t_0,t_1}(p)} = \frac{1}{\sqrt{t_1 - t_0 - 1}} \sqrt{\sum_{t=t_0}^{t_1-1} \overline{(R_{t_0,t_1}(p)} - R_{t,t+1}(p))^2} \quad ,$$

wherein $R_{t,t+1}(p) = \ln(p_{t+1}) - \ln(p_t) \approx \dfrac{p_{t+1} - p_t}{p_t}$, and

wherein $\overline{R_{t_0,t_1}(p)} = \dfrac{1}{t_1 - t_0} \displaystyle\sum_{t=t_0}^{t_1-1} \ln(p_{t+1}) - \ln(p_t)$;

are also applicable here and will not be repeated.

Also, the Examiner correctly states on page 7 of the present Office Action that "Stewart does not explicitly teach the steps of (iv) determining a first and a second coordinate value of a point in phase space based on the volatility and the return; and (v) displaying the point in phase space using a medium selected from the group consisting of: computer display, printed media; and (c) for a plurality of said plurality of sequences of step (b): (i) calculating a probability distribution of the calculated return values; (ii) providing a probability threshold value; and (iii) defining a sub-space of the phase space based on the probability distribution and the probability threshold value; and (iv) enabling the visualization of the sub-space on the medium selected."

However, the Examiner takes Official Notice "that these steps are old and well known in the financial art." The Examiner goes on to state "[f]or instance computing the expected return and variance of a security and plotting in the mean- variance space has been in vogue at least for the last three decades. This plot helps in the selection of securities according one's risk-return preferences. Computing a probability distribution of the calculated return values using the expected return and variance/standard deviation and plotting them is old and well known in the art of Finance and Statistics. This plot enables one understand the variability of the returns and helps in making informed decisions. It would have been obvious to one of ordinary skill in the art at the time of invention to modify Stewart to include this feature. The combination suggests that users would have benefited from selecting a security according to their risk-return preferences and make informed decisions based on their understanding of the variability of the returns. Once again, Applicants respectfully request that if Examiner's statements are based on facts within the personal knowledge of the Examiner, Applicants respectfully request that the Examiner support these facts by filing an affidavit as is allowed under MPEP §707 citing 37 CFR 1.104(d)(2).

Furthermore, Applicants have amended claim 28 (and similarly claim 10) to more clearly recite:

> (iv) *determining a first and a second coordinate value of a point in phase space based on the volatility and the return, wherein the first coordinate value corresponds to an x-axis value of a Cartesian coordinate system, the x-axis being representative of the volatility that has been scaled, and wherein the second coordinate value corresponds to a y-axis value , the y-axis being representative of the return* $R_{t_0,t_1}(p)$; and
>
> (v) *displaying the point in phase space using a medium selected from the group consisting of: computer display, printed media, wherein the point is displayed on the on the Cartesian coordinate system according to the first coordinate value and the second coordinate value* ;

As stated in the previous Response With Amendment, Stewart teaches that the volatility plot represents the fluctuations $x(t_i)$ of the time series $X(t_i)$ by assigning a color to each pixel or small square. (Id.) As further stated in the previous response, the color in each column I and each row j is determined from a comparison of a short pattern of the fluctuations $x(t_i)$ leading up to the

first time t_i with a short pattern of the fluctuations leading up to the second time t_{i-1}. (Col. 7, lns. 4-8). For example, if the Euclidean distance is used, the program computes 104:

$$D(i, j, L) = \left\{ \sum_{l=1}^{L} [x(t_{i-1}) - x(t_{i-j-1})]^2 \right\}^{1/2}$$

Stewart then teaches that the next step is to compute 106 from this distance a color for the pixel in column I, row j. (Col. 7, lns. 31-32). For example, if six distinct colors are used for the small squares, a scaling factor s may be chosen so that when multiplied by D most values of sD fall in the range 0 through 6. (Id). Thus, Stewart discloses display of the volatility of financial returns data as a series of colored areas. Stewart calculates volatility in accordance with the formula above, then scales the result so that the data will fit within a small numerical range corresponding to the available colors.

Nowhere does Stewart teach or suggest:

(iv)   determining a first and a second coordinate value of a point in phase space based on the volatility and the return, wherein the first coordinate value corresponds to an x-axis value of a Cartesian coordinate system, the x-axis being representative of the volatility that has been scaled, and wherein the second coordinate value corresponds to a y-axis value , the y-axis being representative of the return $R_{t_0, t_1}(p)$; and

(v)   displaying the point in phase space using a medium selected from the group consisting of: computer display, printed media, wherein the point is displayed on the on the Cartesian coordinate system according to the first coordinate value and the second coordinate value ;

Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claims 2-7, 10-13, 16, 19, 24, and 26-27, the Examiner merely gives the following statement in support of the rejection of these claims: "the features in these claims are either disclosed by Stewart or are old and well known. The inclusion of these features would help make the computation more robust and efficient." Once again, Applicants respectfully request that if Examiner's statements are based on facts within the personal knowledge of the Examiner, Applicants respectfully request that the Examiner support these

facts by filing an affidavit as is allowed under MPEP §707 citing 37 CFR 1.104(d)(2). Applicants also respectfully requests that the Examiner particularly point out where in Stewart these claims are taught and/or provide references to support this statement.

Accordingly, Applicants believe that the rejection under 35 U.S.C. § 103 has been overcome and respectfully request that this rejection be withdrawn. Claims 2-7, 10-13, 16, 19, and 26-27 depend from independent claims 1 and 23, respectively, and since dependent claims include the limitations of their independent claims, claims 2-7, 10-13, 16, 19, and 26-27 also distinguish over Stewart individually and/or in combination Caccavale as well. Therefore, Applicants respectfully submits that the rejection of claims 1-35 have been overcome and should be withdrawn.

Conclusion

The foregoing is submitted as a full and complete response to the Official Action mailed August 23, 2007, and it is suggested that Claims 1-7, 10-13, 16, 19, and 23-28 are in condition for allowance. Reconsideration of the rejection is requested. Allowance of Claims 1-7, 10-13, 16, 19, and 23-28 is earnestly solicited.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. No amendment made was for the purpose of narrowing the scope of any claim, unless Applicants have argued that such amendment was made to distinguish over a particular reference or combination of references.

Applicant acknowledges the continuing duty of candor and good faith to disclose information known to be material to the examination of this application. In accordance with 37 CFR § 1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment are limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this amendment by the Applicants and the attorneys.

If the Examiner believes that there are any informalities that can be corrected by Examiner's amendment, or that in any way it would help expedite the prosecution

of the patent application, a telephone call to the undersigned at (561) 989-9811 is respectfully solicited.

The Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account **50-1556**.

In view of the preceding discussion, it is submitted that the claims are in condition for allowance. Reconsideration and re-examination are requested. Respectfully submitted,

Respectfully submitted,

Date: December 26, 2007   By: /Jon Gibbons/
                                       Jon A. Gibbons
                                       Reg. No. 37,333
                                       Attorney for the Applicants

Customer Number: 27317
Fleit Kain Gibbons Gutman Bongini & Bianco P.L.
21355 East Dixie Highway, Suite 115
Miami, Florida 33180
Tel: 305-830-2600; Fax: 305-830-2605